Endeavour Inlet Conservation Trust
Annual Bird Monitoring Report 2018

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Cover Image: Yellow-crowned parakeet (kākāriki; *Cyanoramphus auriceps*). Photo credit: Colin Miskelly/New Zealand Birds Online (http://nzbirdsonline.org.nz/).

Introduction

The Endeavour Inlet Conservation Trust (EICT) is a community-run charitable trust aiming to protect and enhance the natural ecosystems and heritage values of Endeavour Inlet in the Queen Charlotte Sound. A key goal of the Trust is to maintain a pest animal control operation and reduce the number of possums, stoats, rats and cats within a core project area extending from the eastern shoreline of the Inlet up to the eastern skyline ridge.

With much effort being put in by the EICT to reduce predator numbers and enhance native biodiversity, a need has been identified to monitor the state and trends of local bird populations. Birds make ideal indicators of environmental health, due to their ubiquitous distributions, the fact that they're vulnerable to a range of environmental threats and that they're relatively easy to monitor compared to other taxa (BirdLife International, 2013).

Five-minute bird counts (5MBC) are the most common method used to monitor changes and trends of forest birds in New Zealand. It has been the standard method for counting forest birds in New Zealand since the early 1970s (Hartley 2012). While 5MBCs do not give an absolute measure of abundance for a particular species, they provide an index of abundance which can be used to make comparisons between years and so describe population trends for a particular species. They are also useful for determining occupancy and creating distribution maps.

The first year of bird monitoring was in 2017 when 31 permanent 5MBC stations were established on a 500m x 500m grid which covered the entirety of the area trapped by EICT (Figure 1). A grid layout was chosen in order gather representative counts from the entire trapped area that account for factors such vegetation type, altitude and aspect. A total of 33 counts were carried out in October 2017. Seventeen species were detected during the counts with bellbirds, silvereyes and grey warblers being the most numerous and widespread species. The first year of bird monitoring provided a "baseline" from which we can now monitor trends in bird populations at Endeavour Inlet using the data collected annually.

This report outlines the results of the second consecutive year of bird monitoring undertaken at Endeavour Inlet by Wildlife Management International Ltd and draws on comparisons between the first and second years of monitoring.

Figure 1: Topographic map of Endeavour Inlet showing the trapped area and locations of the bird count stations.

Methods

Counts were conducted between 24 September and 28 September 2018. The weather was mostly fine with only short periods of light drizzle and almost no wind. All 31 stations established in the previous year were relocated using GPS and counts were conducted in the same spot. Five minutes was spent at each station recording the number of individuals of each species seen and heard from the count station following the standard method of Dawson & Bull (1975).

A coastal and wetland survey was carried out again in the same area at the head of the inlet as in 2017. This was carried out to monitor the diversity and relative abundance of shorebirds that would not be accounted for in five minute bird counts. Approximately one hour was spent walking this area and recording all the birds seen or heard.

All bird count data was entered into a Microsoft Excel spreadsheet and the mean number of birds per 5MBC was calculated for each species. Student's t-test was used to compare the means for each species from the 2017 counts with the 2018 counts and determine if there was any statistically significant differences. Performing these statistical tests is important because a statistically significant result indicates that any difference between the two or more means being compared is very unlikely to have occurred due to chance sampling error, so instead is assumed to represent a real difference in the abundance and/or conspicuousness of native forest birds between years.

QGIS version 2.1.1 was used to plot the distribution of silvereyes and to produce the maps. All bird count data was uploaded to the New Zealand eBird database (http://ebird.org/content/newzealand/) and shared with the Endeavour Inlet Conservation Trust account.

Results

5MBCs

A full round of counts was carried out and 24 stations were counted a second time resulting in a total of 55 bird counts.

Bellbirds were again the most commonly encountered species, being observed in 98% (54 of 55) of counts. Silvereyes dropped from being the second most widespread bird in 2017 (detected in 88% of counts) to the third most widespread in 2018 (detected in 80% of counts). Grey warblers became the second most widespread species, being detected in 91% of counts. Tomtits (44% vs. 30%), Brown Creeper (38% vs. 21%), Tui (25% vs. 18%) and Weka (16% vs. 3%) were all detected in more counts in 2018 than in 2017. Rifleman stayed much the same (16% vs 15%) and again were only detected in beech forest at higher altitudes of > 400m above sea level with the exception of one bird that was counted at a station just off the bridle trail at 322m above sea level. Fantails were detected on fewer counts in 2018 (20%) than in 2017 (30%).

No New Zealand Falcons were detected on any counts this year but a bird was heard calling at The Pines and reports from locals say there is now a pair that are resident at The Pines. Kakariki was the only new species detected on counts with one bird heard calling from Count Station 10 on 25 September 2018. It was no known which species of kakariki it was at the time but the following day three yellow-crowned parakeets were observed in the canopy approximately 400m west of count station 10.

There remains high indigenous dominance at Endeavour Inlet with an average of 4.3 different native species per count versus only 0.36 exotic species per count. There was an average of 8.7 native birds per count and just 0.4 introduced birds per count.
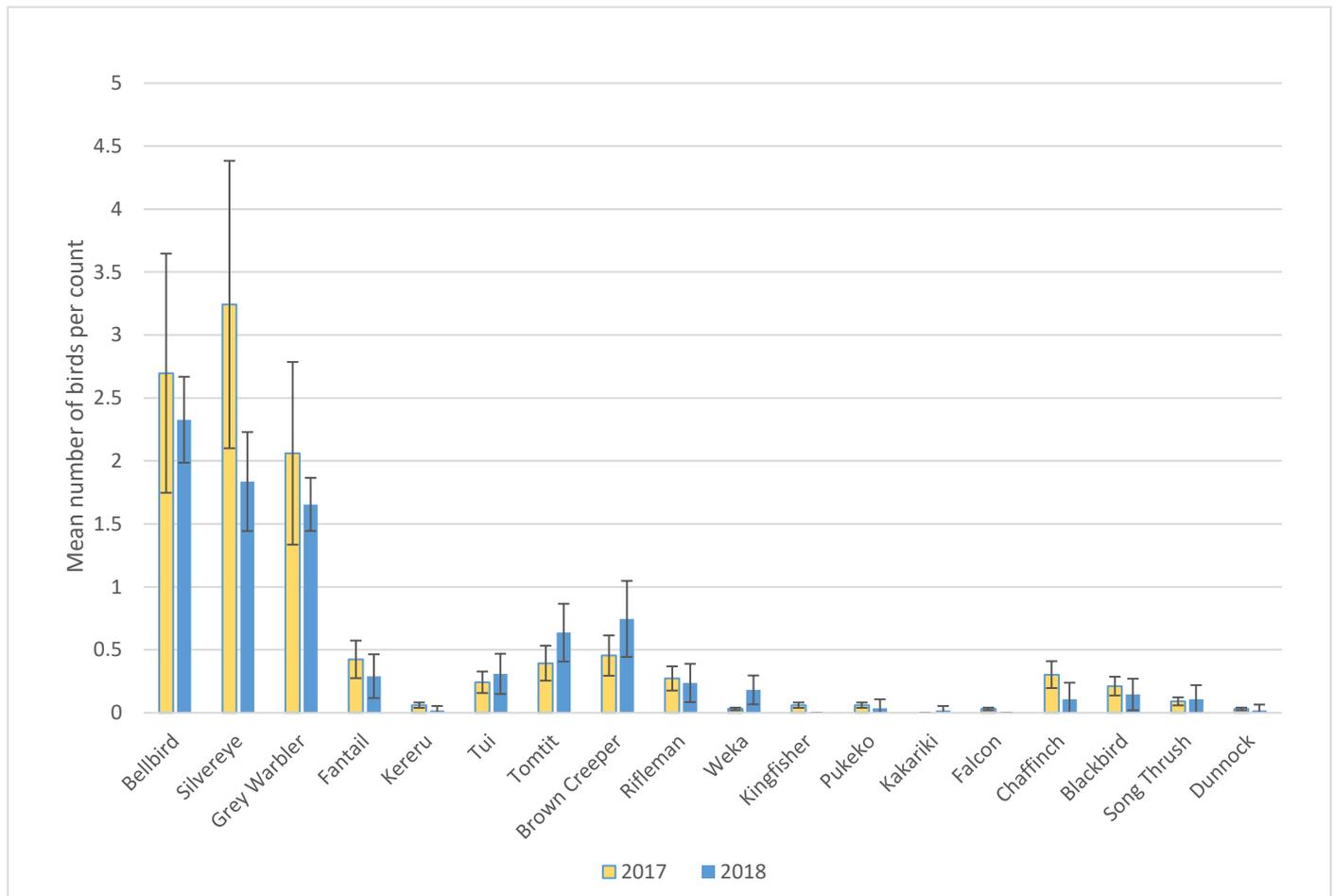

Figure 2: Mean number of birds per count for all species detected in 2017 and 2018. Error bars represent the 95% confidence interval.

There were many small changes in relative abundance for bird species at Endeavour Inlet (Figure 2) but all small changes likely only represent seasonal changes or measurement error. Statistical testing showed that there were only two significant changes (Table 1). Weka had significantly increased from 0.03 individuals per count in 2017 to 0.18 individuals per count in 2018 (two sample t-test, t_{77} = 2.30, p < 0.05). On the other hand, there was a drastic decline in the number of silvereyes detected per count from 3.2 individuals per count in 2017 to 1.8 individuals per count in 2018. Further examination into this trend revealed a specific spatial pattern with silvereyes declining in the southern section (which is dominated by regenerating kanuka forest) of Endeavour Inlet while remaining relatively stable in the rest of the area (Figure 3). In kanuka forest silvereyes decreased from 4.6 birds per count in 2017 to 1.4 birds per counts in 2018 (two sample t-test, t_{20} = 5.40, p < 0.001). In beech and broadleaf forest, there was no significant difference in silvereye numbers from 2017 (2.5 birds per count) and 2018 (2.0 birds per count; two sample t-test, t_{32} = 1.08, p = 0.29).

	Species	2017	2018	Significant Change?	Trend
Native	Bellbird	2.70	2.33	No	
	Silvereye	3.24	1.84	**Yes**	*Decrease*
	Grey Warbler	2.06	1.65	No	
	Fantail	0.42	0.29	No	
	Kereru	0.06	0.02	No	
	Tui	0.24	0.31	No	
	Tomtit	0.39	0.64	No	
	Brown Creeper	0.45	0.75	No	
	Rifleman	0.27	0.24	No	
	Weka	0.03	0.18	**Yes**	*Increase*
	Kingfisher	0.06	0.00	No	
	Pukeko	0.06	0.04	No	
	Kakariki	0.00	0.02	No	
	NZ Falcon	0.03	0.00	No	
Introduced	Chaffinch	0.30	0.11	No	
	Blackbird	0.21	0.15	No	
	Song Thrush	0.09	0.11	No	
	Dunnock	0.03	0.02	No	

Table 1: Mean number of birds per count for all species detected on counts in 2017 and 2018 and whether there is a significant trend for each species.
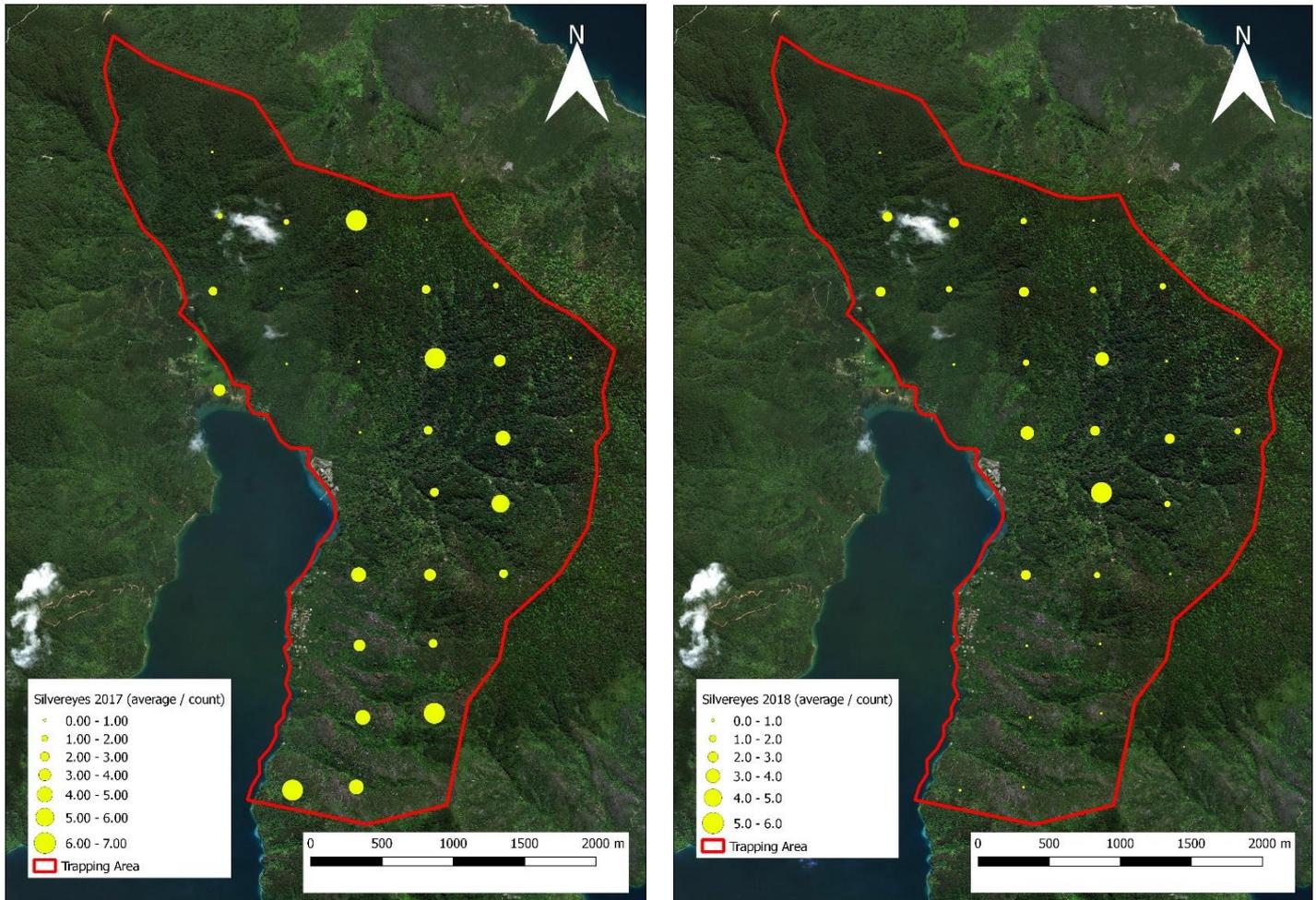
Figure 3: Maps showing the average count data for silvereyes in 2017 (left) and 2018 (right) at all 31 count stations. Note that all six of the southernmost stations occur in kanuka forest.

Coastal and Wetland Survey

No significant changes in species composition or abundance was found on the coastal and wetland survey with most of the same species being found in 2018 as in 2017 (Table 2). One Caspian Tern was seen down on the coast and a New Zealand falcon was seen hunting in this area before flying south east back along the coast towards The Pines.

Species	2017 Count	2018 Count
Paradise Duck	4	6
Mallard	1	0
Pied Shag	2	2
Little Shag	1	0
White-faced Heron	1	1
Variable Oystercatcher	4	2
Black-backed Gull	1	2
Pukeko	5	6
Harrier	1	0
Kingfisher	1	1
Caspian Tern	0	1
New Zealand Falcon	0	1
Weka	0	1
Tui	1	0
Bellbird	3	1
Grey Warbler	5	2
Brown Creeper	4	3
Fantail	3	1
Welcome Swallow	1	1
Silvereye	12	3
Blackbird	1	0
Song Thrush	1	0
Dunnock	2	1
Chaffinch	4	1

Table 2: Summary of birds counted on the coastal and wetland survey in 2017 and 2018.

Discussion and Recommendations

Yellow-crowned parakeets were detected at Endeavour Inlet during one of the counts and the presence of this species is a promising sign. Yellow-crowned parakeets are numerous on many of the nearby predator-free islands such as Motuara Island and may be expanding from these source populations. The fact that kakariki were seen the following day in a similar location suggests that these birds may be resident at Endeavour Inlet and not simply passing through or foraging for the day. With predator control happening at Endeavour Inlet, the hope will be that these birds do not end up as part of a "sink" population and are able to prosper and re-establish a functional population.

Weka are generally thought to go through cyclic boom/busts in population growths and so the increase measured in counts may be indicative that the population is currently increasing (Marchant & Higgins 1993). Further years of monitoring will determine if weka continue to increase at a similar rate.

The apparent decline of silvereyes at Endeavour Inlet is an interesting result as it probably does not represent a true decline but instead a change in habitat use by silvereyes. From the distribution maps, it is clear than in 2017 silvereyes were utilising kanuka forest as a major food source and so were relatively abundant on counts in these habitats. In 2018, silvereyes were largely absent on counts in kanuka forest at Endeavour Inlet meaning that particular food source was no longer present or they were exploiting food sources in other areas. As the numbers remained stable in the beech and broadleaf forests between years, it seem more likely that silvereyes were exploiting food sources outside of the sampled area. This result demonstrates that it is not only changes in predator abundance that drive changes in indigenous bird populations. Other factors such as changes in spatial pattern of food availability must be considered as they have the potential to drive significant changes in local bird abundance and distribution over a relatively short period of time. A very similar trend was found with Tui during bird monitoring in Wellington City parks and reserves between 2011 and 2012 (McArthur *et al.* 2013). A significant decline in Tui abundance was measured between the two years of bird counts but did not represent a true decline but instead a shift in Tui populations to feed on Darwin's barberry (*Berberis darwinii*) that was particularly abundant in 2012.

Five-minute bird counts are typically used for measuring moderate or large increases to common forest species over a long period (Hartley & Greene 2012). However, the results here have proved that even with two years of data, some patterns can be identified. Further years of bird counts will determine if these are one year anomalies or part of a larger and ongoing trend. The wetland and coastal survey in 2018 turned up similar results as in the previous year. The pair of variable oystercatchers appear to be resident at the head of the inlet and it is an encouraging sign that they continue to breed there.

I would recommend that the bird monitoring programme be continued on an annual basis so that changes in diversity, abundance and distribution of native bird species at Endeavour Inlet can be monitored. The coastal and wetland survey should continue as well. As was recommended in the 2017 report, I urge EICT volunteers to contribute observations to eBird as an additional tool for aiding with bird monitoring. The annual bird counts carried out are extremely useful but only provide information for one week of the year. The annual counts are not likely to pick up on rare species but these observations can be captured as data in the form of eBird checklists. Even if rare species are not encountered, any data recorded in eBird can be extremely useful for helping to examine trends. A list of resources to help volunteers with identifying birds, conducting counts and recording their data in eBird is provided in Appendix 2.

References

BirdLife International. 2013. *Birds are very useful indicators for other kinds of biodiversity.* BirdLife International, http://datazone.birdlife.org/sowb/casestudy/birds-are-very-useful-indicators-for-other-kinds-of-biodiversity; accessed 05/10/2018.

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Hartley, L.J. 2012. Five-minute bird counts in New Zealand. *New Zealand Journal of Ecology* 36(3): 1-11.

Hartley, L.J.; Greene, T.C. 2012. Birds: incomplete counts— five-minute bird counts. Unpublished technical report, Department of Conservation, Wellington.

Marchant, S.; Higgins, P.J. 1993. Handbook of Australian, New Zealand & Antarctic Birds. Volume 2, Raptors to lapwings. Melbourne, Oxford University Press.

McArthur, N.; Harvey, A.; Flux, I. 2013. State and trends in the diversity, abundance and distribution of birds in Wellington City reserves. Greater Wellington Regional Council, Wellington.

Appendix 1: GPS tracks from the 2018 bird counts.

Appendix 2: A list of resources to help volunteers with identifying birds, conducting counts and recording their data in eBird.

eBird: http://ebird.org – for entering storing and viewing bird count data for EICT. Also great for exploring wider data such as species range maps.

eBird mobile app: http://help.ebird.org/customer/portal/articles/2411868 - instructions on downloading and using the eBird app to submit count data.

NZ Birds online: http://nzbirdsonline.org.nz – an online tool for helping to identify birds. Has many images of all birds encountered in New Zealand and recordings of calls.

Xeno-canto: www.xeno-canto.org – a site dedicated to sharing recordings of bird calls from all around the world. Has lots of New Zealand recordings.

DOC 5MBC website: http://www.doc.govt.nz/our-work/five-minute-bird-counts/ - information about 5MBCs and some resources**. There is also an online course:** http://www.doc.govt.nz/get-involved/training/online-courses/bird-identification-online-course/ to help with identifying the 10 most commonly recorded birds in New Zealand forests (all of which are present at Endeavour Inlet).

The hand guide (or field guide) **to the birds of New Zealand by Hugh Robertson & Barrie Heather.** Comprehensive book with drawings to help identify New Zealand birds.

Birds of New Zealand: a photographic guide by Paul Scofield and Brent Stephenson. A big book with loads of photos and descriptions for helping identify birds.